

Aquatic Snails (Gastropoda) from National Park Sites in Northern Virginia and Adjacent Maryland, with an Updated Checklist of Regional Species

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ABSTRACT

Twenty-three species of aquatic snails in nine families were documented during water quality monitoring studies and as incidental finds during land snail surveys at National Park sites in Fairfax and Arlington counties, and the City of Alexandria, Virginia, and Prince Georges County, Maryland. County checklists of the regional aquatic snail fauna account for a total of 32 species. The non-native snail *Bellamya chinensis* (Reeve) and the native species *Gyraulus deflectus* (Say) are documented for the first time from Maryland.

Key words: aquatic snails, Gastropoda, Maryland, Virginia.

INTRODUCTION

Non-marine mollusks are rapidly declining globally. Mollusks have the dubious distinction of having the highest number of documented extinctions of any major taxonomic group over the last 500 years with non-marine (freshwater and land) species constituting 99% of all molluscan extinctions (Lydeard et al., 2004). Undoubtedly, the actual number of extinctions is much higher than the documented number because many species likely go extinct before they are discovered. As recently as 1982, freshwater gastropods were thought to be represented in North America (north of Mexico) by 15 families, 78 genera, and approximately 500 species (Burch, 1982). However, just the work of Hershler (1998, 1999) has added 65 hydrobiid species and subspecies from the western United States to that tally. At least 53 species have been recorded from Virginia (Stewart & Dillon, 2004), but few county level checklists have been published for the Commonwealth (Beetle, 1973; Stewart & Dillon, 2004; Dillon et al., 2013). Only Dillon et al. (2013) included county level distribution based on recent surveys, but they did not include Arlington County or the City of Alexandria in the mapped distributions, or perhaps lumped them within Fairfax County. Their findings included 17 extant species of freshwater gastropods (including three limpets) in Fairfax County, Virginia and 12 extant species in Prince Georges County, Maryland.

Additional records from National Park Service (NPS) lands during this study added four species for Fairfax County, ten in Arlington County, eight in the City of Alexandria, and seven in Prince Georges County.

STUDY SITE AND METHODS

Inventories were conducted in streams and along the freshwater tidal and non-tidal shore of the Potomac River in areas managed by NPS, George Washington Memorial Parkway (GWMP), in Fairfax and Arlington counties, and the City of Alexandria, Virginia, from the American Legion Bridge (I-495) to Mt. Vernon, in Great Falls Park, and at National Capital Parks-East (NCPE) in Prince Georges County, Maryland (Ft. Washington and Piscataway parks). Aquatic snails were collected as incidental finds during inventories targeting land snails and when encountered during water quality testing (duMais et al., 2010) in Virginia streams flowing into the Potomac River Gorge (Mine Run, Pimmit Run, Gulf Branch, Turkey Run, Dead Run, Donaldson Run, Spout Run, Difficult Run, and Windy Run). A 0.91 m x 0.91 m kick-seine net (1.6 mm mesh) was used during water quality monitoring to sample riffles. The net was placed perpendicular to the water flow immediately downstream of a sampling area and the streambed in front of the net was vigorously churned for 90 seconds by foot shuffling and lifting and scrubbing larger rocks.

Productive areas for aquatic snails included both shores of the Potomac River, Piscataway Creek in Maryland, and Little Hunting Creek in Virginia. Aquatic snails were also found in swamps and marshes at these locations, the most extensive of which is Dyke Marsh, a 131 ha tidal wetland dominated by narrow-leaved cattail (*Typha angustifolia* L.) and river bull-rush (*Bolboschoenus fluviatilis* [Torr.] Soják) and a surrounding swamp largely composed of pumpkin ash (*Fraxinus profunda* [Bush] Bush). Similar, but smaller, swamps and marshes were sampled in Piscataway and Ft. Washington parks, and along the bank of Little Hunting Creek. Taxonomic nomenclature follows that used by Turgeon et al. (1998), except for the placement of limpets within the Planorbidae following Walther et al. (2010). Shells were keyed to species using Burch (1982) and Jokinen (1992). Voucher specimens from GWMP are deposited in the natural resource collections at GWMP, Turkey Run Park Headquarters in McLean, Virginia. Snails collected at NCPE are deposited at the Museum Resource Center in Landover, Maryland.

RESULTS AND DISCUSSION

A total of 23 species in 9 families was documented in 2010 and 2011 (detailed below). The non-native snail *Bellamya chinensis* and the native species *Gyraulus deflectus* are documented for the first time from Maryland. The collection of *Fontigens bottimeri*, *Lyogyrus granum*, *Physa gyrina*, and *Planorbula armigera*, provide the first evidence that these species are still extant in Fairfax County based on records in Dillon et al. (2013). However, other recent records exist for *F. bottimeri* from Fairfax County (Culver & Pipan, 2008; Culver et al., 2012), and older records exist for *L. granum*, *P. gyrina*, and *P. armigera* from Fairfax County or the vicinity of Washington, DC (Richards, 1934; Beetle, 1973; Stewart & Dillon, 2004; Pearce & Evans, 2008).

Amnicola limosa, *Bithynia tentaculata*, *Goniobasis virginica*, *Gyraulus deflectus*, *G. parvus*, *Menetus dilatatus*, and *Physa acuta* are recorded for the first time from Arlington County and *A. limosa*, *B. tentaculata*, *G. virginica*, *G. parvus*, *Lymnaea humilis*, and *P. acuta* are recorded for the first time from the City of Alexandria. *Bellamya chinensis*, *Bellamya japonica*, *B. tentaculata*, *G. deflectus*, *L. humilis*, and *P. armigera* are reported for the first time from Prince Georges County. *Bellamya chinensis*, *B. japonica*, and *B. tentaculata* are non-native introduced species from Asia (*Bellamya*) and Europe (*Bithynia*). The Fairfax County checklist now stands at 32 species, while 11 species have been recorded in Arlington County, nine species

in the City of Alexandria, and 19 species in Prince Georges County (Table 1). Beetle (1973) reported *Gillia altilis*, *Lioplax subcarinata*, and *Viviparus georgianus* from Fairfax County, while more recent Virginia records from Dillon et al. (2013) only include these snails from a few counties near the southern state line. *Marstonia lustrica* is tentatively reported for Fairfax County based on a record in Thompson (1977) with the caveat that it “need(s) to be confirmed with new material.” Beetle’s (1973) record for *Lymnaea caperata* Say from Fairfax County was not included based on Stewart & Dillon’s (2004) comment that it is a northern species unlikely to have ever occurred in Virginia.

LIST OF SPECIES

VIVIPARIDAE

Campeloma decisum (Say, 1816), Pointed Campeloma – Potomac River Gorge, shore near Sandy Landing and Difficult Run in Great Falls Park (GFP), and at the mouth of Turkey Run, in Turkey Run Park (TRP). A juvenile sinistral specimen was found near Difficult Run on 15 September 2010. This coiling pattern has been reported in juveniles of this species, but is rarely found in mature individuals (Pilsbry, 1896), perhaps indicating an ecological disadvantage for sinistral animals.

Bellamya chinensis (Reeve, 1863), Chinese Mysterysnail – Five mature shells and one 9 mm juvenile shell of this snail were found in Piscataway Creek at the end of Wharf Road. This species is easily distinguished from *Bellamya japonica* (von Martens) by the absence of a spiral angulation of the apical whorls, the spiral row of small pits on the ultimate whorl, and the dark band encircling the inner lip of the aperture. Dillon et al. (2013) did not include any extant records for this species from Atlantic drainages in Virginia or Maryland. The report of *Cipangopaludina* (*Bellamya*) *chinensis* from Virginia by Stewart & Dillon (2004) is probably based on taxonomic confusion that existed at that time with *B. japonica*, a common, widespread species which they did not report. The largest shell found in Piscataway Creek measured 60 mm high.

Bellamya japonica (von Martens, 1861), Japanese Mysterysnail – Regularly observed on the shore of the Potomac River and at Roaches Run Waterfowl Sanctuary, Daingerfield Island, Jones Point, Dyke Marsh, and Accokeek Creek. The largest shell measured 73 mm high.

VALVATIDAE

Valvata tricarinata (Say 1817), Three-ridge Valvata – This species was found only at Dyke Marsh where three shells were collected under a log on a cobble beach on 15 May 2011. In Maryland and Virginia this species is documented as extant only from near Washington, DC in Prince Georges, Fairfax, and Loudoun counties (Dillon et al., 2013).

BITHYNIIDAE

Bithynia tentaculata (Linnaeus, 1758), Mud Bithynia – This non-native snail is sporadic in occurrence, but empty shells can be locally abundant on flood-deposited sand within the Potomac River Gorge from GFP to Key Bridge. Shells were also found on the shore of the Potomac at Dyke Marsh, Roaches Run Waterfowl Sanctuary, Jones Point, and Ft. Washington. Extant populations of this non-native snail in Maryland and Virginia, are centered in the Washington, DC area (Dillon et al., 2013), and an older record exists from Rockbridge County (Beetle, 1973).

HYDROBIIDAE

Amnicola limosa (Say, 1817), Mud Amnicola – One shell was found on the shore of the Potomac River north of Riverside Park and one at Dyke Marsh. It was also found at Roaches Run Waterfowl Sanctuary and Jones Point and was frequently observed on the shore of Piscataway Creek near Wharf Road.

Fontigens bottimeri (Walker, 1925), Appalachian Springsnail – This minute aquatic snail was found at seeps and along the edge of a small stream in GFP and TRP. It is state-listed as Endangered in the Commonwealth (Roble, 2013). Although not included for Fairfax County by Dillon et al. (2013), previous records were noted for the area by Culver & Pipan (2008) and Culver et al. (2012). Their assertion that this species is a hypotelmiorheic specialist is questioned due to its presence along a stream bank in GFP.

Lyogyrus granum (Say, 1822), Squat Duskysnail – The only specimen of this species was found at Dyke Marsh on 9 September 2010.

PLEUROCERIDAE

Pleurocera virginica (Say, 1817), Piedmont Elimia –

This species is frequently observed in shallow water along the shore of the Potomac River throughout the survey area.

Leptoxis carinata (Bruguiere, 1792), Crested Mudalia – This species was found only in the Potomac River Gorge area of GFP and TRP, where it was rare.

POMATIOPSIDAE

Pomatiopsis lapidaria (Say, 1817), Slender Walker – This species was found at Dyke Marsh, Little Hunting Creek, Roaches Run Waterfowl Sanctuary, Jones Point, Swan Creek, and in swamps along Wharf Road. Although it is widely accepted to be an amphibious land snail (Hubricht, 1985), many authors, (e.g., Jokinen, 1992; Dillon et al., 2013), include it in lists of aquatic gastropods. Dillon et al. (2013) do not report *P. lapidaria* from Maryland and list it for only one county in Virginia (Fairfax). Recently, Steury & Pearce (2014) reported this species as common in the Washington, DC area.

LYMNAEIDAE

Lymnaea humilis Say, 1822, Marsh Fossaria – Populations were found at Roaches Run Waterfowl Sanctuary and on the bank of the Potomac River at Daingerfield Island and Jones Point. It was also found on the bank of Piscataway Creek at Wharf Road.

Lymnaea (Pseudosuccinea) columella Say, 1817, Mimic Lymnaea – This species was found only in one short reach of Mine Run where it was collected on rocks a few cm above the water line. National Park Service water quality monitoring data collected between 2005 and 2010 has consistently shown that Mine Run has the best water quality of any Virginia stream in the Potomac River Gorge.

PHYSIDAE

Physa acuta Drapardaud, 1805, European Physa – This species is abundant at Dyke Marsh and was also found in Mine Run and Difficult Run in GFP, at Roaches Run Waterfowl Sanctuary, Jones Point, and on the shore of Piscataway Creek.

Physa gyrina (Say, 1821), Tadpole Physa – This snail was found in potholes of large boulders in the riverside outcrop barren area of GFP. One empty shell found at Dyke Marsh was tentatively identified as this species.

Table 1. Aquatic Gastropods of Arlington and Fairfax Counties and the City of Alexandria, Virginia, and Prince Georges County, Maryland, reported from this survey (N), and in Beetle, 1973 (B); Culver & Papan, 2008 (C), Dillon et al., 2013 (D), Stewart & Dillon, 2004 (S), and Thompson, 1977 (T).

Family	Species	Fairfax	Arlington	Alexandria	Prince Georges
VIVIPARIDAE	<i>Campeloma decisum</i> (Say)	B, D, N, S			
	<i>Bellamya chinensis</i> (Reeve)				N
	<i>Bellamya japonica</i> (von Martens)	D, N, S	N, S	N, S	N
	<i>Lioplax subcarinata</i> (Say)	B, S			
	<i>Viviparus georgianus</i> (Lea)	B, S			
VALVATIDAE	<i>Valvata tricarinata</i> (Say)	B, D, N, S			D
BITHYNIIDAE	<i>Bithynia tentaculata</i> (Linné)	B, D, N, S	N	N	N
HYDROBIIDAE	<i>Amnicola limosa</i> (Say)	B, D, N, S	N	N	D, N
	<i>Fontigens bottimeri</i> (Walker)	C, N			
	<i>Gillia altilis</i> (Lea)	B, S		B	
	<i>Lyogyrus granum</i> (Say)	B, N, S			D
	<i>Marstonia lustrica</i> (Pilsbry)	T			
	<i>Somatogyrus virginicus</i> (Walker)	B			
	<i>Littoridinops tenuipes</i> (Couper)				D
PLEURO CERIDAE	<i>Goniobasis virginica</i> (Say)	B, D, N, S	N	N	D, N
	<i>Leptoxis carinata</i> (Bruguere)	B, D, N, S			
POMATIOPSIDAE	<i>Pomatiopsis lapidaria</i> (Say)	B, D, N, S	B, N, S	N	N
LYMNAEIDAE	<i>Lymnaea humilis</i> Say	D, S	B, N	N	N
	<i>Lymnaea columella</i> (Say)	B, D, N, S			D
PHYSIDAE	<i>Physa acuta</i> Drapardaud	B, D, N, S	N	N	D, N
	<i>Physa gyrina</i> (Say)	B, N, S			
	<i>Physa pomilia</i> (Conrad)	B			
	<i>Physa carolinae</i> Wethington, Wise & Dillon				D
PLANORBIDAE	<i>Gyraulus deflectus</i> (Say)	B, S	N		N
	<i>Gyraulus parvus</i> (Say)	D, N	N	N	D, N
	<i>Helisoma anceps</i> (Menke)	B, D, N, S	B		D
	<i>Helisoma trivolvis</i> (Say)	B, D, N, S			
	<i>Menetus dilatatus</i> (Gould)	B, D, N, S	N		D, N
	<i>Planorbula armigera</i> (Say)	B, N, S			N
	<i>Ferrissia fragilis</i> (Tryon)	D, S			D
	<i>Ferrissia rivularis</i> (Say)	B, D, N, S			
	<i>Laevapex fuscus</i> (C.B. Adams)	D, N			

PLANORBIDAE

Gyraulus deflectus (Say, 1824), Flexed Gyro – One shell attributable to this species measuring 5.1 mm maximum diameter was found on the bank of Piscataway Creek at Wharf Road. Another freshly empty shell was found at Roaches Run Waterfowl Sanctuary. In Virginia, other extant populations are known only from Accomack County (Dillon et al., 2013), but Beetle (1973) cites an older record from Fairfax County. This is the first known record of this species in Maryland.

Gyraulus parvus (Say, 1817), Ash Gyro – Three shells were found at Dyke Marsh and one on a beach at the mouth of Difficult Run in the Potomac River Gorge. The species is abundant at Roaches Run Waterfowl Sanctuary and at Jones Point. One shell was found on the shore of the Potomac River at Ft. Washington Park.

Helisoma anceps (Menke, 1830), Two-ridge Rams-horn – Three snails were collected during water quality sampling in GFP in Difficult Run.

Helisoma trivolvis (Say, 1817), Marsh Rams-horn – Single shells were found in a ditch along the Mt. Vernon Trail near Dyke Marsh, on a muddy shore near Aqueduct Dam, and at the mouth of Difficult Run in GFP.

Menetus dilatatus (Gould, 1841), Bugle Sprite – One snail was found during water quality sampling in Mine Run and three were found in Difficult Run. This species was also found at Roaches Run Waterfowl Sanctuary and a shell was found on the bank of Piscataway Creek at Wharf Road.

Planorbula armigera (Say, 1821), Thicklip Rams-horn – One shell was found under loose bark of a large fallen tree in Dyke Marsh swamp forest and three shells were found at the edge of a vernal pool near the Wharf Road section of Piscataway Creek. Just outside the study area in Charles County, Maryland, this snail was observed to be common in Bull Cove Marsh in association with the land snails *Vertigo ovata* Say and *Carychium exiguum* (Say). The only other extant Virginia records are from the southeastern portion of the state (Charles City, Southampton, and Greensville counties; Dillon et al., 2013). However, this snail was found in Maryland in Montgomery County (Pearce & Evans, 2008) and older records exist for Fairfax County (Beetle, 1973).

Ferrissia rivularis (Say, 1817), Creeping Ancyloid – This limpet was found in Difficult Run where it was common at one sampling site and a single specimen was found in Pimmit Run.

Laevapex fuscus (C. B. Adams, 1841), Dusky Ancyloid – This limpet was found only in Dead Run in TRP.

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